

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1. (Currently amended) An isolated nucleic acid encoding a Slo4 polypeptide comprising an alpha subunit of a Slo potassium channel, the polypeptide:
 - (i) forming, with at least one additional alpha subunit, a potassium channel comprising the characteristic of voltage-gating; and
 - (ii) ~~hybridizing under stringent hybridization conditions to a nucleic acid encoding a polypeptide comprising an amino acid sequence of SEQ ID NO:4, wherein the hybridization reaction is incubated at 42°C in a solution comprising 50% formamide, 5x SSC, and 1% SDS, and washed at 65°C in a solution comprising 0.2x SSC and 0.1% SDS~~ comprising an amino acid sequence having at least 80% sequence identity to SEQ ID NO:4.
2. (Currently amended) The nucleic acid of claim 1, wherein the polypeptide ~~specifically~~ binds to antibodies generated against SEQ ID NO:4.
3. (Original) The nucleic acid of claim 1, wherein the potassium channel further comprises the characteristic of rapid activation.
4. (Original) The nucleic acid of claim 1, wherein the nucleic acid encodes a polypeptide comprising an amino acid sequence of SEQ ID NO:4.
5. (Original) The nucleic acid of claim 1, wherein the nucleic acid comprises a nucleotide sequence of SEQ ID NO:3.
6. (Original) The nucleic acid of claim 1, wherein the nucleic acid is amplified by at least one pair of primers that selectively hybridize under stringent hybridization conditions to the same sequence as the primers selected from the group consisting of:

5'-GGCGTCTGCTTGATTGGTGTAGGA-3' (SEQ ID NO:23)
5'-ATCAAAGTTGAGTTTCCTCCCGAG-3' (SEQ ID NO:24)
5'-CCCGGAGCATCTACCGTACATCTTC-3' (SEQ ID NO:25)
5'-CCAGCTGTTCAAAGTGTATGGGTAG-3' (SEQ ID NO:26)
5'-GCTTGGAGGACCATGTTTCAGGAGT-3' (SEQ ID NO:27)
5'-ATGGTTGATTTGGAGAGCGAAGTG-3' (SEQ ID NO:28)
5'-CAATTTTGAGAGCATGGGCTGTGAAAG-3' (SEQ ID NO:29)
5'-GACTTATGGATCAGAACTTATGCCCAG-3' (SEQ ID NO:30)
5'-CATCTGGTGTAGTTTCATCTTCTGATTGG-3' (SEQ ID NO:31).

7. (Original) The nucleic acid of claim 1, wherein the polypeptide encoded by the nucleic acid comprises an alpha subunit of a homomeric potassium channel.

8. (Original) The nucleic acid of claim 1, wherein the polypeptide encoded by the nucleic acid comprises an alpha subunit of a heteromeric potassium channel.

9. (Currently amended) The nucleic acid of claim 1, wherein the nucleic acid encodes a polypeptide comprising a sequence having at least ~~60%~~ 90% amino acid sequence identity to an amino acid sequence of SEQ ID NO:4.

10-21. (Canceled)

22. (Original) An expression vector comprising the nucleic acid of claim 1.

23. (Original) A host cell transfected with the vector of claim 22.

24-69. (Canceled)